

Association of Musculoskeletal Complaints With Psychosocial Factors Among Nurses in Semnan Hospitals

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Background: Musculoskeletal disorders (MSDs) are common problems among nurses and are associated with many underlying occupational factors.

Objectives: The aim of the study was to evaluate MSDs in nurses regarding psychosocial stress status at work.

Patients and Methods: In this cross-sectional study, all nurses who worked at Semnan City hospitals in 2011 were enrolled. Musculoskeletal symptoms and stress levels were evaluated via Nordic questionnaire.

Results: A total of 286 nurses (89%) out of 320 registered nurses accepted to participate in this study. Female nurses constitute 73.5% of participants. Among the participants, 268 nurses (93.7%) expressed MSDs with involvement of at least one site. The most common MSDs were reported consecutively in low back (66.1%), neck (65.4%) and knee (59.4%). The mean of psychosocial score was 2.82 (95% CI, 2.75-2.89) that indicated a moderate level of stress in participants. A significant association between psychosocial stress and MSDs with involvement of at least one site including shoulders, upper back, elbows and pelvis/legs was seen (adjusted OR, 2.73; 95% CI, 1.06-7.01; P= 0.04).

Conclusions: A high prevalence of self-reported MSDs was observed in association with psychosocial stress. To address MSDs, it is highly recommended to make some additional interventions to reduce psychosocial stress at work.

Keywords: Iran; Nurses; Hospital

1. Background

Musculoskeletal disorders (MSDs) are described as disability, discomfort, or constant pain in joints, muscles, tendons, or other sites with or without overt physical activity (1). Occupational MSDs has been growing in the entire world in the last decade with the worldwide prevalence of 34% (2). There are many risk factors associated with MSDs in different workplaces (3). These factors are categorized into two major groups: (1) physical factors, i.e. poor posture, lifting and carrying heavy loads and repetitive motion tasks; and (2) psychosocial factors, i.e. job satisfaction (4). The most common occupational MSDs are some kinds of tendinitis such as rotator cuff disease, low back pain, osteoarthritis, and neuropathies. These disorders are especially due to rapid and repetitive movement of the muscles and extremities that occur over weeks, months, and years; however, they may sometimes occur following a severe trauma during working (5). Nursing is a job in which MSDs are common and important (6). With regard to work load, nurses are considered as the second grade in comparison to construction workers. Based on some studies, nurses have poor postures during 20% of their working hours and they must usually

lift heavy objects or move patients (7). The results of some researches showed that low back pain with 30% to 60% prevalence was the most common MSDs and it was the second cause of absenteeism after common cold. In these studies, psychosocial factors such as job satisfaction, lack of fitness for work, and lack of the ability to make appropriate career decision had positive association with MSDs (2, 8). On the other hand, personal and social life may be influenced by MSDs. Pain and disability restricts daily activities, causes low self-confidence, social activity withdrawal, and avoidance to be with family (9). Thus, good prophylactic and therapeutic planning is very important for nurses. For such a program we need to know physical and psychosocial risk factors such as work load as well as underlying medical conditions that lead to development or exacerbation of the MSDs. Musculoskeletal complaints represent a common problem for all healthcare workers worldwide (10). Despite their high frequency, only few epidemiological studies have investigated musculoskeletal complaints among some Asian hospital nurses (10, 11). On the other hand, some previous studies in Iranian nurses showed a weak association between psychosocial

factors and musculoskeletal symptoms (11). The aim of this study was to determine the prevalence of musculoskeletal symptoms as well as to assess their association with psychosocial factors among nurses in Iran. There are different organizational, financial, and educational policies among hospitals and the quality and quantity of equipment, working programs, and prophylactic educational approaches among nurses varies among countries and regions; moreover, these policies and conditions certainly change over the time. These factors have a direct or indirect effect on the MSDs as well as psychosocial factors while many of them can be modified.

2. Objectives

The aim of the present study was to evaluate the association of MSDs with psychosocial status among all hospital nursing workers in Semnan City, Iran.

3. Patients and Methods

In this cross-sectional study, all nurses working at Semnan hospitals in 2011 were enrolled. After coordinating with Semnan University of Medical Sciences, a complete list of all registered nurses at the affiliated hospitals (Amiralmomenin, Fatemiyeh and 15-khordad hospitals) with work experience of at least one year was prepared. Study subjects were selected to interview regarding some exclusion criteria including positive history of trauma that had occurred out of the workplace, definitive evidences for rheumatologic disorders such as gout, osteoarthritis, and rheumatoid arthritis and history of diabetes mellitus (because of diabetic neuropathy). All participants were asked to complete Nordic questionnaire containing three parts (12-15). The Nordic musculoskeletal questionnaire was developed from a project funded by the Nordic Council of Ministers with the aim of developing and testing a standardized questionnaire methodology allowing comparison of low back, neck, shoulder and general complaints in epidemiological studies (16). The questionnaire has been applied to evaluate musculoskeletal problems in a wide range of occupational groups including nurses (12, 13, 17). The questionnaire is available from the original paper by Kuorinka et al. (16) and from Evaluation of Human Work, a practical ergonomics methodology (18). Comparing pain in the last seven days and clinical examination provided the sensitivity ranging from 66% to 92% and the specificity ranging from 71% to 88% (15). Farsi version of the questionnaire was introduced as a valid scale by many authors and researchers such as Abdoli and Ormaki (18). The first part of the questionnaire is about demographics and personal information including age, sex, weight, height, educational level, marital status, vacation and hobbies, the entire working hours in a month, working shifts and smoking. The second part concerns musculoskeletal symptoms and aims to report any problem or pain in any of the nine predetermined parts of the body, i.e. neck, shoulder, upper back, elbows, wrists/hands,

low back, pelvis/legs, knees, and ankles/feet, during the preceding year. The third part consists of 34 questions concerning work-related psychosocial factors. There are five options for each question, namely, never, seldom, sometimes, often, and always, with the five scores ranging from one (never) to five (always). If the mean of scores was less than two, we considered participant as a nurse in "low-stress group". If it was equal to or more than two but less than three, the corresponding group was "moderate-stress group" while scores between three and four were classified as "high-stress group"; finally, those with the mean scores more than four were attributed to "very high-stress group" (16, 17, 19). The self-administered questionnaires were filled out by nurses after obtaining informed consent. If the participants did not answer the questions completely, they were asked to fill it again thoroughly. The Collected data were entered in Stata software (Stata Corp, Texas 77845 USA) version 9.2 and statistical significance was set at 0.05. Two-sided Fisher's exact test was used for primary analysis. Crude and adjusted odds ratios (OR) were applied to report magnitude of probable association via fitting simple and multiple logistic regression models.

4. Results

From a total of 320 nurses, 286 participants (89%) completed the questionnaire while 73.5% of them were women. The age of nurses ranged from 21 to 52 years with a mean of 34.1 ± 7.5 years. The employment history ranged from one to 30 years with the mean of 7.3 ± 10.1 years. The mean work hours was 194 ± 33.4 hours per month. A total of 182 participants (63.6%) worked in general wards and 104 (36.4%) in intensive or emergency units. Overall, 268 nurses (93.7%) expressed MSDs with involvement of at least one site (95% CI, 90.9-96.5) and only 18 (6.3%) had no musculoskeletal complaint. The mean of psychosocial score was 2.82 ± 0.6 (95% CI, 2.75-2.89) that showed an overall moderate to high stress. More than half of nurses (62.2%) faced moderate to high stress and almost three-fourths of them were experiencing moderate to very high stress. Table 1 shows distribution of MSDs cases with involvement of at least one of the predetermined sites with respect to their individual, occupational, and psychosocial characteristics.

According to Table 1, 92.2% of female as well as 95.5% of male nurses had musculoskeletal complaints in at least one site. Moreover, 79 nurses (27.6%) belonged to low and moderate and 207 (72.3%) belonged to high and very high psychosocial stress groups. The proportion of MSDs cases were 87.3% and 96.1% in the mentioned groups, respectively. Analyses showed no significant difference between sexes with regard to MSDs. In addition, we could not find any association between MSDs in at least one site and some characteristics including educational level, body mass index (BMI), work shift, age group, and working hours; however, the association between employee history and MSDs in all sites was significant ($P < 0.001$).

Table 1. Musculoskeletal Disorders With Involvement of at Least One Site by Individual, Occupational, and Psychosocial Characteristics

Characteristics	Total	Cases, No. (%) (n = 286)	P Value ^a
Gender			0.3
Female	212	197 (92.9)	-
Male	74	71 (95.9)	-
Age Group, y			0.006
< 35	151	136 (90.1)	-
≥ 35	135	132 (97.8)	-
Educational Degree			0.3
Under Bachelor	16	16 (100)	-
Bachelor and Higher	270	252 (93.3)	-
Work Experience, y			0.02
< 8	131	118 (90.1)	-
≥ 8	155	150 (96.8)	-
Marital Status			0.005
Married	225	216 (96)	-
Single	61	52 (85.2)	-
Body Mass Index, kg/m²			0.1
< 25	156	143 (91.7)	-
≥ 25	130	125 (96.2)	-
Shift Work			1
Constant	78	73 (93.6)	-
Rotational	208	195 (93.8)	-
Working Hours, h			0.07
< 190	134	122 (91.0)	-
≥ 190	152	146 (96.1)	-
Psychosocial Stress Group			0.009
Low and Middle	79	69 (87.3)	-
High and Very High	207	199 (96.1)	-

^a Two-sided Fisher's exact test.

Moreover, there was a remarkable association between age and MSDs in all sites ($P < 0.001$) except for the upper back complains. The prevalence of MSDs was significantly higher in the married nurses in comparison with the single ones ($P < 0.002$). The prevalence of MSDs in neck ($P = 0.006$), pelvis/legs ($P = 0.001$), and knees ($P = 0.03$) were significantly higher in men than in women. The prevalence of ankle disorders varied among educational levels while they were significantly higher in nurses whose educational level was under bachelor degree ($P = 0.02$). Neck, shoulder, wrist, hip, knees, and low back disorders were higher in nurses with BMI of more than 25. Although disorders of shoulders, knees, and ankle were significantly higher among nurses who did not have rotational shifts ($P < 0.05$), working shifts showed no significant association with overall MSDs. The frequencies of MSDs cases regarding their anatomical site of involvement and psychosocial stress grouping are presented in Table 2. The table shows that the most common MSDs among nurses were related to the low back (66.1%), neck (65.4%) and knee (59.4%), consecutively.

The crud and adjusted odds ratios for MSDs occurrence in association with change in level of psychosocial stress are illustrated in Table 3.

As Table 3 shows, there was significant association between occupational psychosocial stress level and MSDs involving at least one anatomical site (Adjusted OR, 2.73; 95% CI, 1.06-7.01; and P value, 0.04). Such significant associations were present for MSDs in shoulders ($P = 0.05$), upper back ($P = 0.02$), elbows ($P = 0.006$), and pelvis/legs ($P = 0.04$).

Table 2. The Frequency of Musculoskeletal Disorders by Involved Anatomical Site and Psychosocial Stress Group

Anatomical Site	Psychosocial Stress Group, No. (%) (n = 286)				Total Cases
	Low	Moderate	High	Very high	
Neck	2 (0.7)	46 (16.1)	115 (40.2)	24 (8.4)	187 (65.4)
Shoulders	1 (0.3)	30 (10.5)	78 (27.3)	25 (8.7)	134 (46.8)
Right			10 (3.5)	7 (2.4)	17 (5.9)
Left		5 (1.7)	5 (1.7)	1 (0.3)	11 (3.8)
Both	1 (0.3)	25 (8.7)	63 (22.0)	17 (5.9)	106 (37.1)
Upper Back	2 (0.7)		74 (25.8)	20 (6.9)	96 (33.6)
Elbows		6 (2.1)	21 (7.3)	12 (4.2)	39 (13.6)
Right		1 (0.3)	9 (3.1)	2 (0.7)	12 (4.2)
Left		3 (1.0)	6 (2.1)	2 (0.7)	11 (3.8)
Both		2 (0.7)	6 (2.1)	8 (2.8)	16 (5.6)
Wrists/Hands		26 (9.1)	58 (20.3)	20 (6.9)	104 (36.4)
Right		6 (2.1)	13 (4.5)	3 (1.0)	22 (7.7)
Left		3 (1.0)	11 (3.8)	3 (1.0)	17 (5.9)
Both	1 (0.3)	17 (5.9)	34 (11.9)	14 (4.9)	66 (23.1)
Pelvis/Legs		11 (3.8)	33 (11.5)	14 (4.9)	58 (20.3)
Knees	1 (0.3)	46 (16.1)	102 (35.7)	21 (7.3)	170 (59.4)
Ankles/Feet	1 (0.3)	23 (8.0)	62 (21.7)	18 (6.3)	104 (36.4)
Low Back	2 (0.7)	41 (14.3)	122 (42.7)	24 (8.4)	189 (66.1)

Table 3. Crude and Adjusted Odds Ratio for Musculoskeletal Disorders in Association With the Change in Level of Psychosocial Stress ^{a,b}

Involved Anatomical Site	Crud OR ^c , 95% CI	P Value	Adjusted OR ^d , 95% CI	P Value
Neck	1.47 (0.97-2.24)	0.07	1.14 (0.73-1.79)	0.5
Shoulders	2.08 (1.37-3.16)	0.001	1.58 (1.00-2.50)	0.05
Upper Back	1.82 (1.20-2.75)	0.005	1.63 (1.06-2.52)	0.02
Elbows	3.16 (1.69-5.86)	< 0.001	2.53 (1.30-4.94)	0.006
Wrists/Hands	1.64 (1.08-2.51)	0.02	1.39 (0.89-2.15)	0.1
Pelvis/Legs	2.33 (1.39-3.91)	0.001	1.78 (1.02-3.09)	0.04
Knees	1.17 (0.78-1.74)	0.4	0.89 (0.58-1.39)	0.6
Ankles/Feet	1.72 (1.13-2.61)	0.01	1.34 (0.85-2.10)	0.2
Low Back	1.92 (1.24-2.96)	0.003	1.49 (0.94-2.37)	0.08
At Least in One Site	3.52 (1.43-8.65)	0.006	2.73 (1.06-7.01)	0.04

^a Psychosocial stress was considered as an ordinal variable as follows: low/moderate, 1; high, 2; and very high, 3.

^b Abbreviation: OR, odds ratio.

^c Simple logistic regression models.

^d Adjusted for age group, work experience, marital status, body mass index and working hours via multiple logistic regression models.

5. Discussion

Based on the studies performed between 2003 to 2010 in Greece (5, 20), China (1), Australia (21), Japan (22, 23), Korea (24) and Nigeria (25), the prevalence of self-reported MSDs in nurses ranges from 74% to 91.1%. In our study, 94% of nurses had MSDs that showed a higher prevalence in comparison to the all abovementioned studies. Our results are more consistent with the study performed by Smith et al. in Japan, which reported the overall MSDs prevalence of 90.1% (22). In our study, the most common involved anatomical sites were low back, neck, knees, and shoulder, consecutively. Our results were consistent with the results from Nigeria (25); in the study from Japan (23), the most common complications were reported in shoulders, low back, neck, and knee, consecutively. In all of the aforesaid studies except the study done in Greece (5), MSDs were not assessed in association with psychosocial factors. In Greek study, no significant association was reported between psychosocial stress and MSDs (5); however, while 9.4% of nurses had high to very high psychosocial stress level in our study, more than 96% of them had MSDs in comparison with 87.3% of nurses who had low to moderate psychosocial stress level. The result showed significant association not only between psychosocial stress and MSDs in general, but also between the stress and disorders in shoulders, elbows, wrists, back, pelvis, and ankles. Therefore, increasing the stress level makes the MSDs more prevalent. To evaluate the association between psychological demands and control on work and the occurrence of MSDs among nursing workers, a cross-sectional study on 491 nursing workers from a university hospital in Brazil was done using Nordic questionnaire and the Job Content Questionnaire. Among the participants, 96.3% reported some pain in any given part

of the body during the preceding year. After adjustments for potentially confusing factors, the shoulder pain (OR, 1.97; 95% CI, 1.07-3.64), thoracic spine (OR, 1.83; 95% CI, 1.02-3.35) and ankles (OR, 2.05; 95% CI, 1.05-4.02) were higher in the high-work demand quadrant when compared to the low-work demand quadrant, (26). In a cross-sectional study performed to evaluate the prevalence of MSDs and their association with psychosocial factors in Iran, 47 hospital-working nurses in Tehran completed Nordic questionnaire. According to the findings, the prevalence of low back, knee, shoulder, and neck pain were 73.2%, 68.7%, 48.6%, and 46.3%, respectively. Moderate and high-stress groups had higher crude and adjusted odds than the low-stress group for involvement of all body sites. The association of neck, wrist/hand, upper back and ankle/foot with psychosocial factors were statistically significant (adjusted OR for high-stress group, 2.4-3.0) (11). Our results are largely compatible with these two mentioned studies, especially in demonstrating the association between psychosocial stress levels and self-reported MSDs.

Occupational stress is usually due to poor working and enterprise conditions and these stresses are influenced by many psychosocial factors (27). These stresses play an important role in the development, improvement, and treatment of MSDs. Therefore, working and psychosocial stresses should be considered together in evaluating MSDs (4). Job dissatisfaction, monotonous tasks, hard work, poor institutional support, lack of sleep, the feeling of working in a hazardous condition, and having multiple jobs are amongst the factors that increase risk of MSDs. These psychosocial stresses have indirect effect on stretching muscles and other physiological process that activate the mechanism of pain (3). We observed a

high prevalence of self-reported musculoskeletal symptoms associated with psychosocial factors and specifically stress. We suggest interventional and correcting measures for job satisfaction in nurses to reduce the MSDs prevalence. These measures include scientific review of their ergonomic postures (28). Hence, based on our findings, psychosocial stresses have an important role in occurrence of MSDs in nurses and in order to reduce the prevalence of these disorders, we recommend not only physical interventional and correcting measures but also giving accurate information about psychosocial factors and how they can control them. As a limitation of the study, the effect of job satisfaction as an important confounding factor was not measured in the study, which must be considered in interpreting the results.

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Authors' Contributions

Daryoush Pahlevan: designing, drafting, and editing the final manuscript; Maryam Azizzadeh: drafting and editing the final manuscript; Atena Esmaili: data gathering and drafting the final manuscript; Raheb Ghorbani: data analysis and drafting the final manuscript; Majid Mirmohammadkhan: data analysis, drafting, editing, and submitting the final manuscript.

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